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THE CONCAVE MIRROR.

Dr. Marshall D. Ewell, Chicago, Illinois.

Considering the many and great improvements in modern stands, it has always seemed strange to me that the mirror has received so little attention. This remark would seem to be especially applicable to the case of those expert manipulators (among whom, so far as my observation goes, Mr. Herbert R. Spencer is *facile princeps*), who habitually use no other sub-stage apparatus in the resolution of difficult tests. Up to this time I have never seen a stand furnished with any other concave mirror than the ordinary sort, in which there are two parallel reflecting surfaces, the posterior one being silvered, and which therefore have two foci distant from each other one-half the thickness of the glass forming the mirror. The image of the source of light formed by the silvered surface is, of course, much more brilliant than the one formed by the unsilvered surface, but nevertheless some confusion must inevitably exist by reason of the want of coincidence of the two foci, and this confusion, as it has seemed to me, must impair the definition of the objective to a sensible degree where the very best results are sought. In order to test the question I procured from the optical works of Mr. John A. Brashear, of Allegheny, Pa., whose silvered-glass reflecting telescopes have justly won a world-wide reputation for excellence, a concave glass mirror accurately figured and of the same size as the mirror furnished with the stand by the late W. H. Bulloch, which first-mentioned mirror is silvered on the anterior figured surface, thereby avoiding the second focus above described.

This mirror I tried on difficult *Amplipleuræ pellucidæ* in balsam, without other substage apparatus, in the same manner as I had tested the concave mirror furnished with the stand, and candor compels me to admit that I could not see any difference whatever in the results obtained with the two mirrors.

My only excuse for presenting this paper is that in my experience failures are often as profitable as successes and may clear the way for a positive advance, and should therefore be recorded for the benefit of other workers.